Properties of Light and Electricity

4-5 The student will demonstrate an understanding of the properties of light and electricity. (Physical Science)

4-5.3 Summarize how light travels and explain what happens when it strikes an object (including reflection, refraction, and absorption).
Taxonomy level: 2.4-B Understand Conceptual Knowledge

Previous/Future knowledge: Students have not been introduced to the concept of light and how it travels in previous grades. They will study reflection, refraction, and absorption as behaviors of waves in the 8th grade (8-6.4).

It is essential for students to know that light travels in a straight line away from the light source. It can travel through transparent material (4-5.4) and even through empty space. The way that light reacts when it strikes an object varies with the object.

Reflection
- When light is *reflected,* it bounces back from a surface.
- Reflection allows objects to be seen that do not produce their own light.
- When light strikes an object, some of the light reflects off of it and can be detected by eyes.
- When light strikes a smooth, shiny object, for example a mirror or a pool of water, it is reflected so that a reflection can be seen that looks very similar to the object seen with light reflected directly from it.
- The color of the light that is reflected from an object is the color that the object appears. For example, an object that reflects only red light will appear red.

Refraction
- When light is refracted it passes from one type of transparent material to another, and changes direction. For example, when light travels through a magnifying glass, it changes direction, and we see a larger, magnified view of the object.
- When a straw is viewed in water, light passes from the water to the air causing the path of the light to bend. When the light bends, the straw appears distorted (bent or broken)

Absorption
- When light is *absorbed* it does not pass through or reflect from a material. It remains in the material as another form of energy.
- The colors of objects are determined by the light that is not absorbed but is reflected by the objects.
- All other colors of light striking the object are absorbed by the object.
- A red object, for example, reflects red colors of light and absorbs all other colors.

It is not essential for students to know about angles of reflection or refraction or the mixing of pigments or light to form various colors.

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Assessment Guidelines:

The objective of this indicator is to *summarize* how light travels and also to *explain* what happens when light strikes an object; therefore, the primary focus of assessment should be to generalize major points about the way light travels and to construct a cause-and-effect model of what happens when light strikes various objects. However, appropriate assessments should also require students to *interpret* diagrams of light traveling and of light striking different objects; *compare* light striking different objects as to the behaviors of reflection, refraction, and absorption; or *recognize* light traveling in a straight line and what happens when it strikes various objects.